Foodborne Poisonings

(Includes poisonings by Ciguatera, Scombrotoxin, Mushroom Toxins, Tetrodotoxin, Paralytic Shellfish and Amnesic Shellfish)

REPORT IMMEDIATELY

May 2003

1) THE DISEASE AND ITS EPIDEMIOLOGY

A. Etiologic Agent

Foodborne poisoning results from ingestion of foods contaminated with toxins. These toxins may occur naturally, may be chemical or biological contaminants, or may be metabolic products of infectious agents that are present in the food. For the purposes of this manual, surveillance and reporting of foodborne poisonings will be limited to poisonings resulting from ingestion of the following naturally occurring toxins:

- **Ciguatera** poisoning is caused by the consumption of tropical and subtropical finfish that have accumulated naturally occurring toxins through their diet. These toxins, which are produced by reef algae, are endemic in tropical areas.
- **Scombrotoxin** poisoning is caused by the ingestion of foods that contain high levels of histamine. Initially the syndrome was associated with fish in the Scombroidea family (tuna, mackerel, skipjack and bonito); however, non-scombroid fish (mahi-mahi, bluefish and salmon) have also commonly been associated with this illness. While scombrotoxin poisoning is usually associated with spoilage of fish, any foods with appropriate amino acids that are subjected to certain bacterial contamination and growth may lead to scombroid poisoning when ingested.
- **Mushroom toxin** poisoning is caused by the consumption of raw or cooked fruiting bodies of a number of species of wild fungi.
- **Tetrodotoxin** poisoning is caused by the consumption of tetrodotoxin, found most commonly in the liver, intestines and skin of pufferfish. Tetrodotoxin has also been found in other species, including parrotfish, porcupine fish, ocean sunfish, species of newts and salamanders, frogs, blue-ringed octopus, starfish and xanthid crabs. The metabolic source of the toxin is unknown; however, there is evidence of production by several bacterial species including *Pseudomonas* species and *Vibrionaceae*.
- **Paralytic shellfish poisoning (PSP)** is caused by the consumption of shellfish that have been contaminated with various toxins produced by dinoflagellates they have fed upon. High concentrations of these toxins occur primarily during periods of algae blooms known as "red tides."
- **Amnesic shellfish poisoning (ASP)** is caused by the consumption of shellfish contaminated with domoic acid, a toxin produced by algae known as *Pseudonitzschia* species.

B. Clinical Description

Ciguatera: Symptoms occur within 24 hours of eating tropical or subtropical finfish, with gastrointestinal (GI) symptoms occurring as early as one hour after consumption. Predominant GI symptoms include diarrhea, vomiting, and abdominal pain. Neurologic symptoms, including paresthesia, pain and weakness in the lower extremities, "aching teeth," facial flushing, headache, vertigo and myalgias, are common and may occur at the same time as the GI symptoms or follow 1–2 days later. In severe cases, patients may also develop hypotension (low blood pressure). Most patients recover within a few weeks; however, in severe cases neurologic symptoms may persist for weeks to months.

Scombrotoxin: The initial symptoms of mouth tingling or burning, facial flushing, sweating, palpitations, dizziness, rash, headache, and itching of the skin occur rapidly and often progress to nausea, vomiting and diarrhea within a few hours. Symptoms resolve completely within 12 hours with no long-term sequelae.

Mushroom toxins: Clinical disease varies with the type of mushroom and dose ingested. In some cases mushroom toxicity can be fatal. Incubation periods can be as short as 15 minutes to as long as 2 weeks.

There are four general categories of mushroom toxins. The first are the protoplasmic toxins. Characteristic symptoms include sudden or severe seizures of abdominal pain, persistent vomiting, extreme thirst, lack of urine production, and headache. More than 50% of cases will experience liver, kidney, cardiac or muscular damage. Protoplasmic toxins are the most likely of the mushroom toxins to cause death or irreversible organ damage. The second category of mushroom toxins is the neurotoxin, which results in neurologic signs and symptoms. Neurotoxins found in certain species of mushrooms may cause dizziness, periods of drowsiness followed by periods of hyperactivity, illusions, delirium and hallucinations. The third category is the gastrointestinal irritant, which causes diarrhea, vomiting and nausea. The fourth category is disulfiram-like toxin, which is generally nontoxic unless alcohol is consumed within 72 hours of ingestion of the toxin, in which a short-lived, acute toxic syndrome can occur.

Tetrodotoxin: The first symptoms of intoxication usually appear within 20 minutes to 3 hours, and they include numbing of the lips and tongue followed by paresthesia in the face and extremities. Dizziness, ataxia, headache, nausea and diarrhea may also occur. Paralysis, convulsions, mental impairment and cardiac arrhythmia cause death in up to 60% of cases.

Paralytic shellfish poisoning (PSP): Ingestion of contaminated shellfish results in symptoms appearing within minutes to several hours. Symptoms are predominantly neurological, including paresthesias of the mouth and extremities, drowsiness and incoherent speech. These symptoms are also frequently accompanied by GI symptoms. Symptoms usually resolve within a few days. Severe cases involving ataxia, muscle paralysis and respiratory arrest may result in death.

Amnesic shellfish poisoning (ASP): Symptoms can be both gastrointestinal and neurologic. Gastrointestinal symptoms include nausea, vomiting, abdominal cramps, and diarrhea and usually develop within 24 hours of the consumption of toxic shellfish. In severe cases, neurological symptoms also appear, usually within 48 hours of toxic shellfish consumption. These symptoms include dizziness, headache, seizures, disorientation, short-term memory loss, peripheral neuropathy, respiratory difficulty, and coma. Some persons develop permanent neurologic deficits, especially dementia.

C. Reservoirs

Foodborne poisonings occur as a result of consuming preformed toxins found in the sources listed above.

D. Modes of Transmission

Foodborne poisonings are caused by the ingestion of preformed toxins and are not transmitted from person-to-person.

E. Incubation Period

- **Ciguatera:** 1 to 24 hours,
- **Scombrotoxin:** immediate to 3 hours,
- **Mushroom toxins:** immediate to 14 days,
- **Tetrodotoxin:** immediate to 3 hours,
- **Paralytic shellfish poisoning (PSP):** immediate to 3 hours,
- **Amnesic shellfish poisoning (ASP):** gastrointestinal symptoms usually develop within 24 hours, neurologic symptoms within 48 hours.

F. Period of Communicability or Infectious Period

These toxins are preformed when ingested and only affect the person who has consumed them, but as long as the contaminated sources are available for consumption, foodborne poisoning is a threat. These toxins are not killed by heat or cold storage. These food borne poisonings are not transmitted person-to-person.

G. Epidemiology

- **Ciguatera** poisoning is a significant public health threat in areas of the world where consumption of reef fish is common. It is estimated that more than 400 species of fish have the potential for becoming toxic, with large predatory fish being the most toxic of these. Domestically, numerous cases of ciguatera poisoning are reported each year from Hawaii, Florida, Puerto Rica and the U.S. Virgin Islands.

- All humans are susceptible to **scombroid** poisoning, and it remains one of the most common causes of fish poisoning in the U.S. Occurrence of scombroid poisoning is worldwide. Because of the global nature of fish processing and packaging, there are no geographic boundaries for fresh, processed or frozen products. Risks appear to be greatest, however, from fish caught by recreational fishermen or fish caught in areas without adequate refrigerated storage.
- All humans are susceptible to **mushroom toxins**. Poisoning resulting from consuming mushrooms occurs most often among novice mushroom hunters who misidentify and consume toxic species. Poisonings have also occurred among immigrants who consume poisonous North American mushroom species that closely resemble edible species from their native lands. Mushroom poisonings tend to be more frequent in the spring and fall, when most species are at the height of their fruiting stage.
- Cases of **tetrodotoxin** poisoning are rarely reported in the U.S. Outbreaks have occurred in the Indo-Pacific region of the world, with numerous cases reported from Japan annually.
- All humans are susceptible to **paralytic shellfish poisoning**. High concentrations of these neurotoxins occur most frequently during algae blooms known as "red tides" and are particularly common in shellfish harvested from colder waters. Most cases of PSP occur in those who gather shellfish for their own consumption, perhaps while unaware of or disregarding local shellfish harvesting warnings and regulations.
- **Amnesic shellfish poisoning** was first identified as a marine toxin disease in late 1987 in Canada, but it was later also identified in Washington State and Oregon and in the marine food web along the coast of Texas. All humans are susceptible to this shellfish poisoning. The elderly are particularly predisposed to serious neurological symptoms similar to those of Alzheimer's disease. All fatalities to date have involved elderly patients.

2) REPORTING CRITERIA AND LABORATORY TESTING SERVICES

A. New Jersey Department of Health and Senior Services (NJDHSS) Case Definition

There is no formal surveillance case definition for foodborne poisonings. Report all cases of ciguatera poisoning, scombrotoxin poisoning, mushroom toxin poisoning, tetrodotoxin poisoning, paralytic shellfish poisoning or amnesic shellfish poisoning. **diagnosed by a healthcare provider.**

B. Laboratory Testing Services Available

This testing is not available from the Division of Public Health and Environmental Laboratories.

3) DISEASE REPORTING AND CASE INVESTIGATION

A. Purpose of Surveillance and Reporting

- To identify transmission sources of public health concern (*e.g.,* a restaurant or commercially distributed food product) and to stop transmission from such sources.

B. Laboratory and Healthcare Provider Reporting Requirements

The New Jersey Administrative Code (N.J.A.C. 8:57-1.8) stipulates that health care providers and laboratories report (by telephone, confidential fax, over the Internet using the Communicable Disease Reporting System (CDRS) or in writing) all cases of foodborne poisonings to the local health officer having jurisdiction over the locality in which the patient lives, or, if unknown, to the health officer in whose jurisdiction the health care provider requesting the laboratory examination is located.

C. Local Department of Health Reporting and Follow-Up Responsibilities

1. **Reporting Requirements**

The New Jersey Administrative Code (N.J.A.C. 8:57-1.8) stipulates that each local health officer must report the occurrence of any case of foodborne poisoning, as defined by the reporting criteria in Section 2 A above. Current requirements are that cases be reported to the NJDHSS Infectious and Zoonotic Diseases Program using the CDS-1 form. A report may also be filed electronically over the Internet using the confidential and secure Communicable Disease Reporting System (CDRS).

Case Investigation

a. It is the local health officer's responsibility to complete the CDS-1 form by interviewing the patient and others who may be able to provide pertinent information. Much of the information on the CDS-1 form can be obtained from the patient's healthcare provider or the medical record.

b. Use the following guidelines in completing the form:
   1. Record "Foodborne Poisoning" as the disease being reported.
   2. Record the patient's demographic information.
   3. Record the date of symptom onset, symptoms, date of diagnosis, hospitalization information (if applicable), and outcome of disease (*e.g.,* recovered, died).
   4. Obtain a food history for 72 hours prior to symptoms, or if the organism was identified, between the minimum and maximum incubation periods (refer to Section 1E: Incubation Period). **If two or more persons became ill**, attempt to focus on the suggested time frame for common meals/food items. Include the date and time food was consumed, number of persons exposed (both ill and well), food item(s) consumed, name of establishment (restaurant, store, etc.) where food was obtained, and the place food was consumed.
      Note: If mushrooms or fish are implicated, indicate the species/type suspected, if known.
      Use the Patient Food History Listing, Patient Symptoms Line Listing and Food-Specific Attack Rate Table Worksheet forms to facilitate recording additional information.
   5. Record the name and affiliation of the person completing the worksheet (yourself) and the person reporting the illness (complainant).
   6. Record the number of persons ill, symptoms, date(s) of symptom onset, names of ill persons, and other medical and laboratory information.
   7. Other persons who have eaten the implicated food should be interviewed regarding their exposure. In most cases, if they were going to become ill that would have already occurred but in some instances, such as mushroom ingestion, they should be advised to seek medical attention.
   8. Determine whether any food (leftovers or unopened) is available for testing. See Section 4 D, Environmental Measures.
   9. If the investigation points to a commercially processed food item, attempt to obtain product and manufacturer information.
   10. Include any other comments received during the initial complaint in the "Notes" section.
      NOTE: When reporting electronically, enter this collected information into "Comments" section.
   11. If there have been several unsuccessful attempts to obtain case information (*e.g.* the patient or healthcare provider does not return your calls or respond to a letter, or the patient refuses to divulge information or is too ill to be interviewed), please fill out the forms with as much information as possible. Please note on the form the reason why it could not be filled out completely.

. After completing the form, mail (in an envelope marked "Confidential") to the NJDHSS Infectious and Zoonotic Diseases Program, or the report can be filed electronically over the Internet using the confidential and secure Communicable Disease Reporting System (CDRS). The mailing address is:

NJDHSS
Division of Epidemiology, Environmental and Occupational Health
Infectious and Zoonotic Diseases Program

P.O.Box 369
Trenton, NJ 08625-0369

c. Institution of disease control measures is an integral part of case investigation. It is the local health officer's responsibility to understand, and, if necessary, institute the control guidelines listed below in Section 4, "Controlling Further Spread."

4) CONTROLLING FURTHER SPREAD

A. Isolation and Quarantine Requirements (N.J.A.C. 8:57-1.12)

None.

B. Protection of Contacts of a Case

None.

C. Managing Special Situations

Reported Incidence Is Higher than Usual/Outbreak Suspected

If the number of reported cases of foodborne poisonings in city/town is higher than usual, or if an outbreak is suspected, investigate to determine the source of infection and mode of transmission. A common vehicle (such as contaminated shellfish or certain species of the fish) should be sought and applicable preventive or control measures should be instituted (*e.g.,* removing implicated food items from the environment). Use the Patient Food History Listing and Patient Symptoms Line Listing forms to facilitate recording additional information. Consult with the NJDHSS Infectious and Zoonotic Diseases Program at 609.588.7500. The Program staff can help determine a course of action to prevent further cases and can perform surveillance for cases that may cross several jurisdictions and therefore be difficult to identify at a local level.

D. Preventive Measures

Environmental Measures

Implicated food items must be removed from the environment. A decision about testing implicated food items can be made in consultation with the Infectious and Zoonotic Diseases Program and the Food and Drug Safety Program (FDSP). FDSP can help coordinate pickup and testing of food samples. If a commercial product is suspected, FDSP will coordinate follow-up with relevant outside agencies (e.g., FDA, USDA). FDSP can be reached at 609.588.3123.

Note: The role of the FDSP is to provide policy and technical assistance with the environmental investigation such as interpreting the New Jersey Food Code, conducting a hazardous analysis and critical control point (HACCP) risk assessment, initiating enforcement actions and collecting food samples.

The general policy of the PHEL is only to test food samples implicated in suspected outbreaks, not in single cases (except when botulism is suspected). The health officer may suggest that the holders of food implicated in single case incidents locate a private laboratory that will test food or store the food in their freezer for a period of time in case additional reports are received. However, leftover food consumed within the incubation period with a known epidemiologic link to a single, confirmed case may be considered for testing under special circumstances.

Personal Preventive Measures/Education

In most cases individuals cannot properly protect themselves from many foodborne poisonings, especially those that are seafood-related, since there are no telltale signs to indicate the presence of toxins. Individuals can educate themselves, however, about edible mushrooms if harvesting. They should be warned to consume only mushrooms that they can identify. If collecting shellfish, individuals should be warned to pay attention to local warnings and ordinances regarding that practice. They should also only buy seafood products from licensed, commercial, reputable vendors, and handle appropriately (*i.e.,* refrigerating immediately and cooking and serving as soon as possible).

ADDITIONAL INFORMATION

There is no formal CDC surveillance case definition for foodborne poisonings. CDC case definitions are used by state health departments and the CDC to maintain uniform standards for national reporting. Diagnostic decisions are made based on clinical presentations and histories of exposure when there are no other reasonable explanations for the illness. For reporting a case to the NJDHSS, always refer to the criteria in Section 2 A.

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